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BALANCING ACCESSION AND RETENTION: THE DISAGGREGATE
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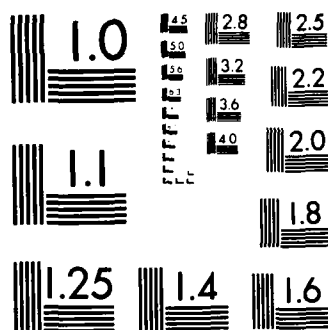
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PROFESSIONAL PAPER 374 / August 1982

BALANCING ACCESSION AND RETENTION: THE DISAGGREGATE MODEL

Deborah Clay-Mendez
Ellen Balis

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Naval Studies Group

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BALANCING ACCESSION AND RETENTION

INTRODUCTION

This paper summarizes a model that balances the costs of accession and retention for non-prior service male recruits with four-year service obligations. We find that a policy of higher first-term reenlistment bonuses and smaller cohorts of recruits would enable the Navy to meet its career-force requirements at lower cost.

A number of recent studies deal with the supply of recruits to the Navy, a vital issue in view of the declining size of the youth cohort. A variety of studies also deal with the responsiveness of first-term reenlistments to bonuses, an important issue given the shortage of career petty officer and the goal of a 600 ship Navy. To date, however, the question of possible trade-offs between accession and retention has received little attention.

In the short run, the size of the first-term cohort eligible for reenlistment in each Navy rating is fixed. Reenlistment bonuses are set in an effort to meet immediate career-force requirements, given the number eligible for reenlistment. Over the long run, however, career-force requirements for a rating can be met by training fewer recruits and retaining a larger percentage, or by training more recruits and

retaining a smaller percentage. Our aim is to examine the balance between accession and retention in a period of increasing career-force requirements.

A brief summary of the model used in addressing this issue follows. Most of this paper is devoted to a discussion of specific applications. Additional detail about the model and data is forthcoming in a CNA study report.

THE MODEL

We use a simulation model to minimize the sum of recruiting, training, and reenlistment bonus costs for first-term manpower, while allowing the Navy to meet its requirements for individuals in their fifth year of service. Due to a variety of data constraints, the analysis is restricted to non-prior service males with an initial active duty obligation of four years.

A major assumption underlying the model is that the wages and the value of the marginal products of first-term individuals not in training are equal. Under this assumption, the Navy will benefit from raising first-term reenlistment bonuses if the cost of the bonus is offset by the savings in recruiting and training costs resulting from the higher reenlistment rate. Because the model views incoming recruits principally as a means for meeting career force goals, it is most

appropriate when applied to situations where the size of the career force — rather than the level of first-term manpower — is the major concern.

The model has two parallel components. On the one hand, it simulates the flow of recruits from recruiting through the first-term reenlistment decision. On the other hand, it estimates the costs of recruiting, recruit training, A-school training,* and reenlistment bonuses associated with the recruit flow. Both the recruit flows and the cost estimates are disaggregated into the 27 different rating groups and 4 recruit quality types shown in table 1. Recruits assigned to general detail work (Gendets) are treated as a separate group (number 28).

The Flow of Recruits

The Navy's decision variables within our model include the number of recruits of each quality type assessed, the proportion of each quality type initially assigned to the different A-schools or to apprenticeship training, and the level of the first-term reenlistment bonus for each rating. By controlling these variables, the Navy determines the flow of recruits from enlistment through the first-term

* An A-school consists of a series of courses designed to train a recruit for a specific occupation (Navy rating). Following recruit training, recruits are assigned either to an A-school or — if they are destined to do general detail work — to a brief apprenticeship training course.

TABLE 1

Recruit Quality Types

1. High school diploma graduates in the upper mental groups (I-IIIU)
2. High school diploma graduates in the lower groups (IIIL-V)
3. Non-graduates in the upper mental groups (I-IIIU)
4. Non-graduates in the lower mental groups (IIIL-V)

Rating GroupsTechnical

1. ET (Electronics Technician)
2. FT (Fire Control Technician)
3. AE (Aviation Electricians Mate), AQ (Aviation Fire Control Technician), AT (Aviation Electronics Mate), AX (Antisubmarine Technician), TD (Training Device Technician)
4. ST (Sonar Technician)

Semi-Technical

5. EM (Electricians Mate), IC (Interior Communications Electrician)
6. IM (Instrumentman), ML (Molder), OM (Opticalman), PM (Pattermaker)
7. DT (Dental Technician), HM (Hospital Corpsman)
8. MR (Machiner Repairman)
9. MM (Machinists Mate)
10. AD (Aviation Machinists Mate), AM (Aviation Structural Mechanic), AS (Aviation Support Equipment Technician)
11. AC (Air Controlman), AW (Aviation ASW Operator)
12. AO (Aviation Ordnancemen)
13. BU (Builder), CE (Construction Electrician), CM (Construction Mechanic), EA (Engineering Aid), EO (Equipment Operator), SW (Steelworker), UT (Utilitiesman)
14. OS (Operations Specialist), QM (Quartermaster)
15. DP (Data Processing Technician)
16. RM (Radioman)
17. OR (Ocean Systems Technician)
18. GM (Gunners Mate), TM (Torpedoman)
19. MN (Mineman)
20. CT (Crypologic Technician), IS (Intelligence Specialist)
21. DM (Illustrator Draftsman), JO (Journalist), LI (Lithographer), MU (Musician), PH (Photographers Mate)

Non-Technical

22. HT (Hull Maintenance Technician)
23. AK (Aviation Storekeeper), DK (Disbursing clerk), SH (Ships Serviceman), SK (Storekeeper), MS (Mess Management Specialist)
24. BT (Boiler Technician)
25. AB (Aviation Boatswains Mate), PR (Aircrew Survival Equipmentman)
26. AG (Aerographers Mate), AZ (Aviation Maintenance Administration Man), PC (Postal Clerk), PN (Personnelman), YN (Yeoman)
27. BM (Boatswains Mate), SM (Signalman)
28. Gendet; General Detail Workers

reenlistment decision point. Figure 1 presents a simplified view of this flow for one quality type and one rating group. The broken arrows mark where the decision variables enter. The solid arrows correspond to transition probabilities that are fixed in the model. These probabilities are calculated from historical data for each rating group and quality type of recruit.

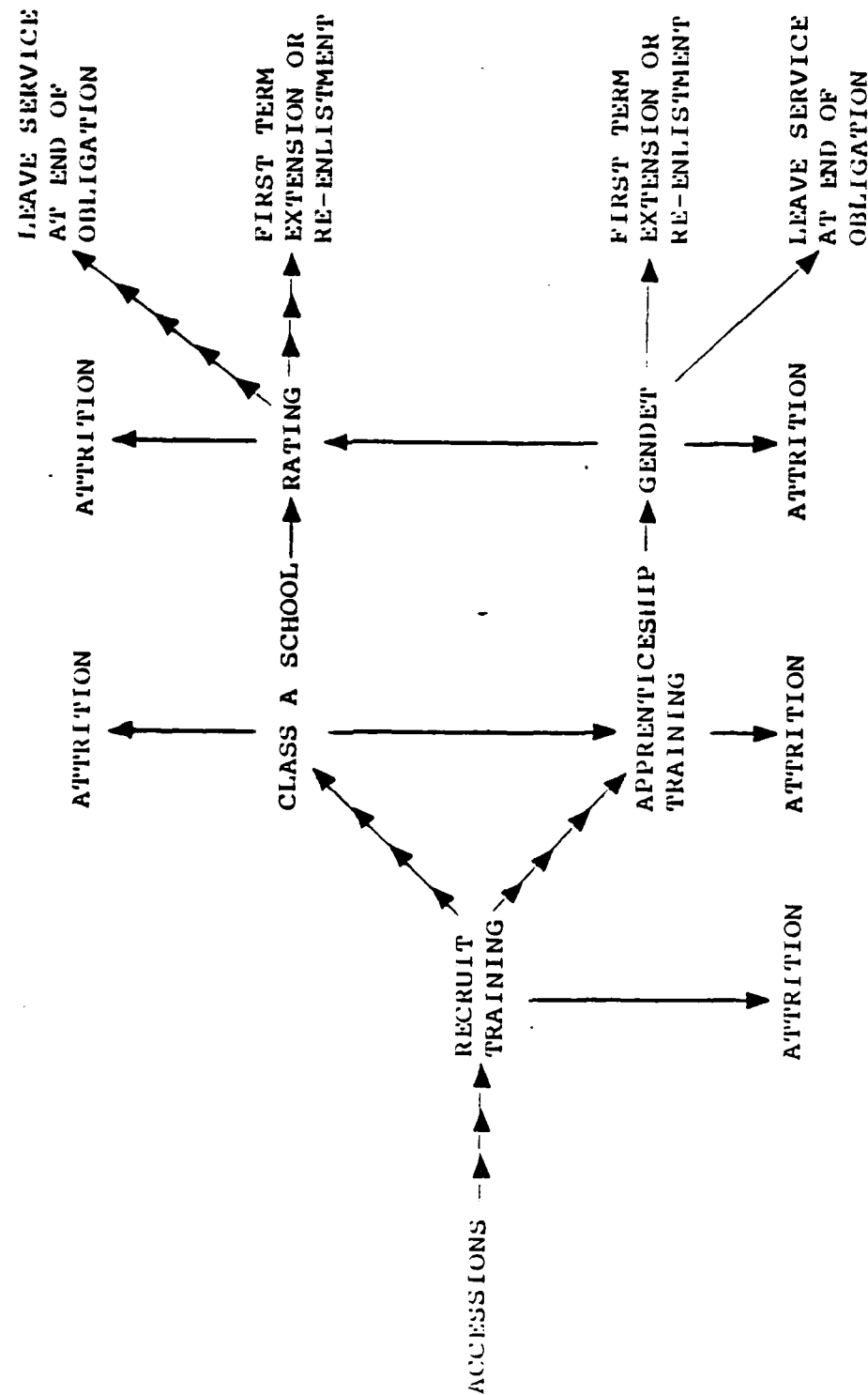
Consistent with previous research, we assume a positive relationship, approximated by a logistic function, between first-term reenlistment rates in each rating group and the level of the reenlistment bonus. The Navy controls reenlistment rates by varying the bonus levels. Rating group specific estimates of the bonus effect were available based on earlier work done at CNA by John Warner and Matthew Goldberg [1]. We are confident that — for the most part — rating groups with high, medium, and low responsiveness to bonuses are correctly identified. Because of uncertainty about the exact magnitude of some of the coefficients, however, the reader should not rely heavily on conclusions based on any single rating group.

Inter-Action Between Rating Groups

Individuals who become Gendets after failing A-school or who are initially assigned as Gendets can eventually qualify for one of the other rating groups through on-the-job training or by returning to A-school. In the full-scale model, this leads to inter-actions between

Figure 1

FLOW FOR GIVEN QUALITY TYPE



the policies for one rating and the recruit flow into other ratings. There is some probability that an individual of a given quality type who is initially assigned to training for rating A will emerge at LOS-4 (length of service cell 4) eligible to reenlist in rating B. We constructed a 28 x 28 matrix of these historical probabilities for each recruit quality type. For each quality type, the Navy determines a 28 element vector representing initial training assignments. The product of this assignment vector and the 28 x 28 probability matrix is a 28 element vector whose elements are the number of individuals at length of service cell 4 eligible for reenlistment in the different rating groups.

Use of the Recruit Flow to Identify Consistent Policies

While this model can estimate the flow of recruits under any set of recruiting, assignment, and reenlistment bonus policies, we are mainly concerned with sets of policies that enable the Navy to meet its requirements for individuals starting their second term of service (length of service cell 5 in our model). In applying the model, we identify these sets of policies by working backwards from requirements. A reenlistment bonus policy — consisting of a vector of 27 reenlistment bonus levels — is selected.* Given this policy, the requirements for second term individuals of a specific quality type in each rating group determines the number of eligibles at length of service cell 4 required

* The bonus level for Gendets is constrained to be equal to zero as we have no estimate of their responsiveness to reenlistment bonuses.

in that group. The product of this vector of eligibles and the inverse of the 28×28 probability matrix for that quality type is an initial assignment vector. The sum of the elements in the assignment vector* is the total number of recruits of that quality type required. For each possible bonus policy, there is a recruiting and an assignment policy consistent with meeting second-term requirements.

Estimating the Costs of Alternative Sets of Policies

Each set of policies considered implies a different set of recruiting, training and reenlistment bonus costs. The second aspect of the model is the estimation of these costs. All costs are calculated in 1982 dollars and are discounted at a 10 percent annual rate unless otherwise specified.

Estimates of recruiting costs are derived from the model of recruit supply developed previously at CNA by Larry Goldberg [2]. This supply model predicts numbers of male, high-school graduate Navy recruits based on levels of Navy advertising, numbers of recruiters, the level of military compensation, and other economic and demographic factors. Using estimates of the cost of Navy recruiters and advertising, we transformed this supply equation into a cost function specifying the minimum cost of obtaining different numbers of male, high school diploma graduates with four-year obligations. The cost function exhibits

* When adjusted for attrition during recruit training.

increasing marginal costs, the counterpart of decreasing marginal products in the supply equation. Estimates of the cost of recruiting non-graduates are not available. In applying the model, sensitivity analysis can be used to deal with this issue.

The costs of recruit training, specialized A-school training for the different rating groups, and apprenticeship training were calculated using long run average cost data provided by the Chief of Naval Education and Training (CNET). In this data, the cost of training recruits varies by recruit quality type only because of differences in attrition rates. Since possible differences in the difficulty of teaching the recruits are not taken into account, the cost advantage of recruits in the upper mental groups may be understated.

Reenlistment bonus costs are calculated in a straightforward manner under the assumption that all reenlistments are for four years. Approximately 26 percent of those who reach the fifth year of service in the model do so by extending their first term for less than three years, and are not eligible for bonus payments.*

* Approximately 40 percent extend initially, but some of these later reenlist.

APPLICATIONS OF THE MODEL

We used this model to estimate the costs of policies consistent with career-force requirements. The set of requirements we use is based on observed levels of manning in 1981. All males in their fifth year of service who had enlisted as non-prior-service four-year obligors were identified on the basis of quality type and rating group. In the aggregate, this yields a requirement for 9400 at LOS-5 (length of service cell 5).

Matching the Empirical Force under Current Policies

We first established a base case reflecting the costs of current policies. This was done by working backwards from the empirical force using actual 1981 bonus policies. We find that 52.2 thousand male, non-prior-service four-year obligor recruits were required, 70 percent of whom were high school diploma graduates. At length of service cell 4, 32.8 thousand of these recruits were eligible to reenlist. Under the 1981 bonus policies, the continuation rate (extension plus reenlistments) from year 4 to year 5 was 28.7 percent. Estimated inventory at year 5 ($.287 \times 32.8$ thousand) matches the aggregate empirical force requirement of 9,400. The maximum deviation from the empirical force in any mental group or rating type was by 7 individuals.

Since these recruit flows are based on the attrition rates prevailing between 1980 and 1981, the number of recruits that we estimate is required to match the 1981 empirical force does not correspond to the number actually recruited in 1977. It represents the number that would have to be recruited now — given current attrition patterns — in order to maintain current LOS-5 manning under 1981 bonus policies.

Outlined below, in 1982 dollars, are the annual steady-state costs associated with these recruit flows.

TABLE 2
ANNUAL STEADY STATE COSTS OF CURRENT POLICIES

Recruiting and AFEEES ^a processing costs for 34.6 HSDGs	\$103.8M	20.5%
Recruit Training Costs	130.0	25.6%
A-school and Apprenticeship Training Costs	241.5	47.6%
Reenlistment Bonus payments:	<u>31.6</u>	<u>6.2%</u>
	\$506.9M	99.9%

^a Armed Forces Entrance Examination Stations.

Using a 10 percent annual discount rate, the presented-discounted cost of sending a cohort from the enlistment point through the reenlistment point is \$489.9 million. The average present-discounted

cost for each individual required at LOS-5 is \$52.0 thousand.* (This is \$489.9 million/9417 required.) Reenlistment bonuses account for 4.4 percent of this discounted cost.

Matching the Empirical Force in the Absence of Selected Reenlistment Bonuses

If the current first-term reenlistment bonus program were to be eliminated for male, four-year obligors, the LOS-4 to LOS-5 continuation rate for this group would fall by approximately 3 percentage points. Additional eligibles and hence additional recruits would be needed to meet the empirical force requirement.

The annual, steady-state costs of matching the empirical force in the absence of reenlistment bonuses are presented below. These costs are \$48.1 million greater than steady-state costs under the current bonus program. On the average, each dollar allocated to SRB payments allows a 2.5 dollar savings in recruiting and training costs.

* This excludes both the cost of first-term compensation during periods when the recruits are not in training and also the ultimate costs of the retirement system. The exclusion of retirement costs does not bias comparisons between alternative policies as these costs are constant for a fixed level of LOS-5 manning.

TABLE 3
MATCHING THE EMPIRICAL FORCE IN THE ABSENCE OF
FIRST-TERM BONUSES

	<u>Annual Costs</u>	<u>Change from Current Policy (1981)</u>
Recruiting and AFEES Processing Costs ^a	\$128.0M	\$+24.2M
Recruit Training Costs	147.0	+17.0
A-school and Apprenticeship Training Costs	280.0	+38.5
Reenlistment Bonus Costs	0	-31.6
	<u>\$555.0M</u>	<u>\$+48.1M</u>

^a A recruit cohort of 41.3 thousand male, four-year obligors with high school diplomas and 17.8 thousand male, four-year obligors without high school diplomas was required under the zero bonus policy.

Yet this steady-state comparison actually understates the savings from maintaining the current SRB program. If the Navy tried to abandon the SRB program while continuing to match empirical force requirements, it would have to raise recruiting, recruit training, and A-school flows approximately 4 years before it could lower selected reenlistment bonus payments. The present discounted cost of this policy change is calculated by making the following comparison:

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4 and onward</u>
New Policy	\$555.0M +31.6 \$586.6M	\$555.0M +31.6 \$586.6M	\$555.0M +31.6 \$586.6M	\$555.0M
Current Policy	\$506.9M	\$506.9M	\$506.9M	\$506.9M
Cost of Transition	\$+79.7M	\$+79.7M	\$+79.7M	\$+48.1M

Based on a 10 percent annual discount rate, the Navy would lose \$567.5 million present-discounted dollars by eliminating the reenlistment bonus program for male, four-year obligors. If the discount rate is 3 percent, the present-discounted loss is \$1695.4 million.

Matching the Empirical Force Using Higher Reenlistment Bonuses

Our next step was to search for the set of reenlistment bonuses that minimizes the cost of meeting empirical force requirements. Not all possibilities could be examined; with 7 possible bonus levels for each of 27 rating groups, there are 7^{27} possible sets of policies.

As a starting point for our simulations, we identified the optimum bonus policy for each rating in a model where there are no recruiting costs and where only those initially assigned to a rating can become

eligible for reenlistment in that rating. In this less complex model, the cost of producing an individual of a specific quality type eligible for reenlistment is constant. It depends only on the training costs, attrition rates, and eligibility rate for that quality type in that rating. Table 4 illustrates the cost/eligible for ADs, AMs, and ASs* of the different quality types.

TABLE 4
COSTS PER REENLISTMENT ELIGIBLE AD, AM, AS

	Quality Type 1	Quality Type 2	Quality Type 3	Quality Type 4
AFEES processing cost/eligible	\$200	\$300	\$1,000	\$900
Recruit training cost/eligible	4,400	5,400	7,300	6,400
A-school training cost/eligible	8,100	9,000	10,600	10,300
Total cost/eligible	\$12,700	\$14,700	\$18,900	\$17,600

The present-discounted cost/individual at LOS-5 in a rating group depends on both the cost/eligible and on the continuation rate between LOS-4 and LOS-5. The continuation rate is in turn a function of the reenlistment bonus level for the rating group. Table 5 shows the present-discounted cost of each AD, AM or AS at LOS-5 under alternative reenlistment bonus levels.** A bonus level of 4 minimizes the

* Aviation Machinist Mates, Aviation Structural Mechanics, and Aviation Support Equipment Technicians.

** First-term reenlistment bonus levels in the Navy range from 0 to 6. Individuals reenlisting in a rating with a bonus level (multiple) of 4 will receive a bonus equal to 4 x 1 months base pay x the number of years in the reenlistment. The reenlistment must be for at least 3 years.

(discounted) sum of recruit training, AFES processing, A-school and reenlistment bonus costs for quality type 1.

TABLE 5
PRESENT DISCOUNTED VALUE OF COST PER
AD, AM, OR AS AT LOS-5

<u>Bonus Multiple</u>	<u>Quality Type 1</u>	<u>Quality Type 2</u>	<u>Quality Type 3</u>	<u>Quality Type 4</u>
0	\$30,000	\$26,400	\$34,100	\$34,800
2	28,200	25,500	32,200	32,500
4	27,800	25,700	31,540	31,900
6	28,300	26,800	31,900	32,400
8	29,900	28,700	33,100	33,700

Taking the set of bonus multiples derived from this model as starting values, we ran a series of simulations using the full NACCS model (including the recruiting cost function and the flows into ratings from the Gendet community). These simulations tested the bonus multiples for each rating. In ratings where changes from the starting value led to a reduction in total costs, the bonus multiple was raised or lowered until no further improvement was found. This allowed us to approximate the optimal set of bonus multiples.

The resulting optimal set of bonus levels is shown in column 1 of table 6. The optimal bonus level equals or exceeds current (1981) bonus levels in all rating groups. In all but two rating groups, the optimal

TABLE 6

OPTIMAL VS. HISTORICAL BONUS LEVELS BY RATING GROUPS

	(1)	(2)	(3)
	<u>Optimal</u>	<u>1981 Actual</u>	<u>Average</u>
	<u>Bonus Levels</u>	<u>Bonus Level</u>	<u>Bonus Levels</u>
			<u>1974-82</u>
Technical Rating Groups			
1. ET	9	6.0	3.8
2. FT	17	5.0	4.0
3. AE,AQ,AT,AX,TD	11	1.4	1.8
4. ST	19	0.0	4.1
Median	17	3.2	3.9
Mean	14	3.1	3.4
Semi-Technical Rating Groups			
5. EM,IC	10	2.7	2.9
6. IM,MK,OM,DM	15	0.6	1.2
7. DT,EM	9	0.0	1.1
8. MR	13	0.0	1.6
9. MM	11	6.0	5.5
10. AD,AS,AM	5	0.0	.9
11. AC,AW	8	4.4	3.9
12. AO	6	0.0	1.1
13. BU,CE,CM,EA,EO,SW,UT	6	1.2	.7
14. OS,QM	8	3.9	3.8
15. DP	0	0.0	.5
16. RM	9	0.0	1.0
17. OT	8	0.0	2.2
18. GM,IM	10	2.0	3.1
19. MN	0	0.0	.9
20. CT,IS	7	0.7	1.6
21. DM,JO,LI,MU,PH	4	0.0	.2
Median	8	0.0	1.2
Mean	7.6	1.2	1.8
Non Technical Rating Groups			
22. HT	16	1.0	3.3
23. AK,DK,SH,SK,MS	4	1.1	.7
24. BT,EN	13	4.0	3.9
25. AB,PR	5	0.4	.9
26. AG,AZ,PC,PN,YN	2	0.0	.4
27. BM,SM	5	0.2	.3
Median	5	0.7	.9
Mean	7.5	1.1	1.7

levels exceed the long run average bonus multiples prevailing in the period 1974-1982.*

The highest multiples, as one would anticipate, are seen in the most technical ratings where training costs are high. When high bonus multiples are found in non-technical ratings (BTs and HTs, for example) it may be because the occupations are uncongenial and the reenlistment rate low in the absence of bonuses.**

Outlined below is an estimate of the annual steady state costs of meeting the empirical force requirements under this optimal bonus policy.

The present-discounted cost of a cohort under policy 1, from recruiting through the reenlistment decision, is \$307.9 million. If such an extreme bonus policy were realistic, the present-discounted

* The exceptions are group 15 (DP) and group 19 (MN).

** In "Models of Accession and Retention," a forthcoming CNA memorandum, we find that a lower reenlistment rate due to non-pecuniary factors is associated with a higher optimal reenlistment bonus. This result emerges if we assume, consistent with previous empirical work [3], that the relationship between reenlistment rates and bonus levels is approximated by a logistic function.

savings from adopting this policy (and abandoning the current policy) would amount to approximately \$827 million dollars.*

TABLE 7
MATCHING THE EMPIRICAL FORCE USING
THE UNCONSTRAINED OPTIMAL POLICY

	<u>Costs</u>	<u>% Change from Costs Under Current Policy</u>
Recruiting and AFES processing costs ^a	\$55.3M	-46.7%
Recruit training costs	87.5	-32.7%
A-school and apprenticeship training costs	147.3	-39.0%
Reenlistment bonus costs	172.8	+446.8%
Total	<u>\$462.9M</u>	<u>-8.7%</u>

^a For 23.5 thousand male four-year obligor high school diploma graduates and 11.7 thousand non-graduates.

These unconstrained estimates of the optimal bonus policies are, however, unrealistic in three respects. (1) Our estimates of the impact of bonus levels on reenlistments are based on observed bonus levels ranging from zero to 6; we cannot predict far beyond this range. (2) It is politically unrealistic to consider multiples far

* Based on the following comparison and using a 10 percent discount rate:

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5 ...</u>
New Policy	\$290.1M +31.6 <u>\$321.7M</u>	\$290.1M +31.6 <u>\$321.7M</u>	\$290.1M -31.6 <u>\$321.7M</u>	\$462.9M	\$462.9M
Current Policy	\$506.9M	\$506.9M	\$506.9M	\$506.9M	\$506.9M
Savings	\$185.2M	\$185.2M	\$185.2M	\$44.0M	\$44.0M

beyond this range. (3) These bonus multiples, if used to match the empirical force, would be associated with a decline in first-term manning of approximately 36 percent.* This is unacceptable.**

In view of these difficulties, we investigated the costs associated with the two less extreme bonus policies shown in table 8. Policy 2 is the same as the optimal bonus policy in table 6, except that all bonus multiples greater than 6 are constrained to be equal to 6. The multiple is equal to 6 in 20 of 27 rating groups. Policy 3 is, in addition, constrained so that the decline in first-term manning does not exceed 15 percent in any rating group. As this constraint is not binding in all rating groups the aggregate decline in first-term manning (10.3 percent) is less than 15 percent.

* Based on the number eligible for reenlistment.

** If such a decline were to occur, the relative scarcity of first-term personnel might raise the value of their marginal product to the Navy above the first-term wage rate. It would no longer be appropriate to balance recruiting, training, and reenlistment bonus costs. See p. 2, above.

TABLE 8
CONSTRAINED BONUS MULTIPLES

	Policy 2 Maximum Multiple = 6	Policy 3 Maximum Multiple = 6 Decline in First-Term Manning = 10.3%
Technical Rating		
1	6	6
2	6	6
3	6	3
4	6	5
Mean	6	5
Median	6	5.5
Semi-technical		
5	6	4
6	6	2
7	6	1
8	6	2
9	6	6
10	5	2
11	6	6
12	6	2
13	6	2
14	6	5
15	0	0
16	6	2
17	6	4
18	6	4
19	0	0
20	6	3
21	4	5
Mean	5.1	2.9
Median	6	2
Non-Technical		
22	6	2
23	4	2
24	6	5
25	5	2
26	2	2
27	5	2
Mean	4.6	2.5
Median	5	2

The annual steady state costs associated with policies 2 and 3 are shown below.

TABLE 9
ANNUAL STEADY-STATE COSTS UNDER ALTERNATIVE POLICIES

	<u>Policy 2</u>	<u>% Change from Current</u>	<u>Policy 3</u>	<u>% Change from Current</u>
Recruiting and AFEES Processing	\$ 68.0M	-34.5%	\$ 88.1M	-15.1%
Recruit Training	100.5	-22.7%	118.0	-9.2%
A-school and Apprenticeship Training	181.7	-24.8%	217.1	-10.1%
Reenlistment Bonus	<u>116.8</u>	<u>+269.6%</u>	<u>62.4</u>	<u>+97.5</u>
	\$467.0M	-7.9%	\$485.6M	-4.2%

The present-discounted cost of a cohort under policy 2 is \$422.8 million as opposed to \$489.8 million under policy 1. The present-discounted value of a permanent shift from current policy to policy 2 is \$632 million. Under policy 3 the present-discounted cost of a cohort is \$458.6M and the present-discounted value of a permanent shift from current policy is \$295M. Even under this severely constrained alternative, a \$30.8M annual increase in bonus payments leads to a \$52.1M decline in training and recruiting cost in the steady state.

We conclude that a shift from current policy to policy 3 offers the Navy a large proportion (36 percent) of the total present-discounted

savings offered by the much less realistic policy 1. 48.4 percent of the annual steady state savings offered by the unconstrained solution (policy 1) are also offered by this constrained solution.

SUMMARY

In this analysis, we investigated the savings that could be achieved from using selected reenlistment bonuses to improve the long-run balance between accession and first-term retention in the Navy. Due to a variety of data constraints, the analysis is restricted to non-prior service males with four-year service obligations. We found that under current policies the costs of accession outweigh the costs of retention for four-year obligors in all Navy ratings. As a result, the same career force can be obtained at less cost with the use of higher reenlistment bonuses. Bonus levels should be raised the most in ratings with the highest first-term attrition and the highest training costs. We estimate that increases in reenlistment bonus payments could yield substantial savings, both in the short run and in the steady state.

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